



## Morbidity in the marshes: Using spatial epidemiology to investigate skeletal evidence for Malaria in Anglo-Saxon England (AD 410-1050)

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### Abstract:

Concerns over climate change and its potential impact on infectious disease prevalence have contributed to a resurging interest in malaria in the past. A wealth of historical evidence indicates that malaria, specifically *Plasmodium vivax*, was endemic in the wetlands of England from the 16th century onwards. While it is thought that malaria was introduced to Britain during the Roman occupation (AD first to fifth centuries), the lack of written mortality records prior to the post-medieval period makes it difficult to evaluate either the presence or impact of the disease. The analysis of human skeletal remains from archaeological contexts is the only potential means of examining *P. vivax* in the past. Malaria does not result in unequivocal pathological lesions in the human skeleton; however, it results in hemolytic anemia, which can contribute to the skeletal condition cribra orbitalia. Using geographical information systems (GIS), we conducted a spatial analysis of the prevalence of cribra orbitalia from 46 sites (5,802 individuals) in relation to geographical variables, historically recorded distribution patterns of indigenous malaria and the habitat of its mosquito vector *Anopheles atroparvus*. Overall, those individuals living in low-lying and Fenland regions exhibited higher levels of cribra orbitalia than those in nonmarshy locales. No corresponding relationship existed with enamel hypoplasia. We conclude that *P. vivax* malaria, in conjunction with other comorbidities, is likely to be responsible for the pattern observed. Studies of climate and infectious disease in the past are important for modeling future health in relation to climate change predictions.

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### Resource Description

#### Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes

#### Geographic Feature:

resource focuses on specific type of geography

Other Geographical Feature

**Other Geographical Feature :** Marshland

#### Geographic Location:

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resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Country

**Other European Country :** England

**Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Vectorborne Disease

**Vectorborne Disease:** Mosquito-borne Disease

**Mosquito-borne Disease:** Malaria

**Model/Methodology:** ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction

**Resource Type:** ☒

format or standard characteristic of resource

Research Article

**Timescale:** ☒

time period studied

Historical